DNV·GL

Certificate No:
TAM000011Y

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Turbocharger

with type designation(s)
A175, A275, A280

Issued to
HSD Engine Co., Ltd.
Changwon-si, Gyeongsangnam-do, Republic of Korea

is found to comply with
DNV GL rules for classification – Ships Pt.4 Ch.3 Sec.1 Reciprocating internal combustion engines

Application :

Products approved by this certificate are accepted for installation on all vessels classed by DNV GL.

Issued at **Høvik** on **2019-03-07**
This Certificate is valid until **2024-03-06**.
DNV GL local station: **Gimhae Station**

Approval Engineer: **Tage Olav Alexander Strøm**

for **DNV GL**

Oddvar Deinboll
Head of Section

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid.
The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

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Job Id: **262.1-030602-1**
Certificate No: **TAM000011Y**

Product description

Exhaust driven turbochargers served by cylinder groups with combined power in the range up to 30000 kW

Application/Limitation

Max. operation speed and exhaust gas temperature for A175 turbochargers

Turbocharger Type		Turbine Type	Compressor Type	Compressor wheel diameter (mm)	Nmax (1/s)	Tmax (C°)
A175	-32	TV08	CV06	619.440	295	550
	-34		CV07	668.995	275	
	-35		CV08	693.773	275	
	-37		CV09	693.773	269	
	-32	TV09	CV06	619.440	285	550
	-34		CV07	668.995	275	
	-35		CV08	693.773	275	
	-37		CV09	693.773	269	

Max. operation speed and exhaust gas temperature for A275 and A280 turbochargers

A275	TV09	CV21	693.773	260	550
A280	TV09	CV21	783.963	230	550

The stated speeds and temperatures are the highest allowed values and should not be exceeded at any time, nor at engine overload (110%). For each specific application, the ratings shall be corrected according to makers instructions.

Maximum allowable compressor ratio:

Full load continous at N_{Bmax}: 5.1
Short duration at N_{Mmax}: 5.6

ALARM LEVELS:

Overspeed	
Condition:	Alarm level:
$N_{Mmax} \geq 1.02 \times N_{Bmax}$	$N_{Alarm} \geq 1.02 \times N_{Bmax}$
$1.01 \times N_{Bmax} \leq N_{Mmax} < 1.02 \times N_{Bmax}$	$N_{Alarm} = N_{Bmax}$
$N_{Bmax} \leq N_{Mmax} < 1.01 \times N_{Bmax}$	$N_{Alarm} \geq 0.99 \times N_{Bmax}$

N_{Mmax} is the turbocharger operational limit at 110% short duration engine load as stated on the rating plate.
N_{Bmax} is the turbocharger operational limit at 100% engine load, as stated on the rating plate.
N_{Alarm} is the application dependent alarm level value based on maker's safety concept.
The overspeed alarm value shall be specified in the individual turbocharger DNVGL Product Certificate.

High exhaust temperature at turbine entry, maximum alarm level: T_{Mmax} -15°C.
T_{Mmax} is the turbocharger operational limit at engine overload, as stated on the rating plate.

Minimum lubrication oil pressure at turbocharger inlet (alarm level):
0.8 bar (gauge pressure)

Maximum lubrication oil outlet temperature (alarm level):

100°C (45°C lubrication oil temperature at inlet)
120°C (85°C lubrication oil temperature at inlet)

Application constraints

Allowable inclination of turbocharger that may occur during operation is limited to ±15° in lateral and longitudinal directions continusly and to ±22.5° temporary.

Maximum allowable vibration level (both self- and externally induced) has to be within the specified limits given in the maker's Operational Manual

Tests carried out

Type test of A175-L Turbocharger 2008-11-28 Report: HZX-VB 9207

Marking of product

The product to be marked with manufacturer's name or trademark and type number identification.

Periodical assessment

For retention of the type approval, a DNV GL surveyor shall perform an assessment after 2 years and after 3.5 years, to verify that the conditions of the type approval are complied with. A renewal assessment will be performed at renewal of the certificate.